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Economic Impact of Environmental Controls on the Fruit & Vegetable Canning & Freezing Industries

PART I
EXECUTIVE SUMMARY

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A Report to
Council on Environmental Quality

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Agri Division
Dunlap and Associates, Inc.
Manhattan, Kansas

ECONOMIC IMPACT OF ENVIRONMENTAL CONTROLS ON THE FRUIT AND VEGETABLE CANNING AND FREEZING INDUSTRIES

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PREFACE

This volume is one in a series of reports developed by the Agri Division, Dunlap and Associates, Inc. for the Council on Environmental Quality as part of a comprehensive study entitled: Economic Impact of Environmental Controls on the Fruit and Vegetable Canning and Freezing Industries. The set of reports include:

Part I: Executive Summary

Part II: Industry Structure

Part III: Impact Analysis

Part IV: Statistical Supplement

These reports complete the program of work as planned and specified under Contract PA 71-53.

CONTENTS

		Page
	PREFACE	
I.	INTRODUCTION	i
II.	DEMAND CHARACTERISTICS	
	A. Products and Substitute Products	ii
	B. Size, Location and Relative Importance of Markets	ii
	C. Recent Trends in Demand and Price	iv
	D. Distribution Systems	iv
	E. Market Competition	iv
	F. Governmental Influences	iv
III.	SUPPLY CHARACTERISTICS OF THE FRUIT AND VEGETABLE INDUSTRY	
	A. Types and Locations of Raw Materials	v
	B. Number and Location of Firms/Plants	v
	C. Characteristics of Fruit and Vegetable Canning and Freezing Plants	v
	D. Employment	vii
	E. Capacity and Utilization of Capacity	vii
	F. Industry Segmentation	vii
IV.	METHODOLOGY	
	A. Analytical Approach	viii
	B. Water Pollution Abatement Costs	viii
V.	INDUSTRY ANALYSIS	
	A. Size of Firms	xi
	B. Impact of Other Variables	xi
	C. Sensitivity Analysis of Pollution Abatement Cost	xii
VI.	OVERALL IMPACT ON THE INDUSTRY	
	A. Price Increase	xiv
	B. Impact on Profitability and Financial Position of the Industry	xiv
	C. Industry Dislocations	xv
	D. Employment	xvi
	E. Raw Product Suppliers	xvi
	F. Supplies and Customer Impacts	xvii
	G. International Trade	xvii
VII.	SPECIFIC ECONOMIC DISLOCATION	
	A. Regional Impacts	xviii
	B. Local Impacts	xx

EXECUTIVE SUMMARY

ECONOMIC IMPACT OF ENVIRONMENTAL CONTROLS ON THE FRUIT AND VEGETABLE CANNING AND FREEZING INDUSTRIES

I. INTRODUCTION

In an effort to reverse the progressive deterioration of the environment, currently available pollution abatement technology is being improved with intensified research and development efforts. The impact of such intensification of environmental management is being seen in terms of reduction of environmental degredation associated with the disposal of industrial wastes throughout the nation.

However, the implementation of environmental controls normally results in added costs and may result in economic and locational adjustments within these industries. It is the purpose of this study to examine these adjustments as they relate to the fruit and vegetable processing industries in terms of costs, capital requirements, profits, industry structure and location, employment, product prices and regional and national economic impacts.

The general approach used in this study was to initially analyze and describe the characteristics of supply, demand, price and operating requirements of these industries and given this base, evaluate the microeconomic relationships among representative firms within the fruit and vegetable processing industries as a first step; and, second to then project macroeconomic impacts at the industry level based on the resulting microeconomic impact relationships which were developed.

Throughout this study, excellent cooperation and assistance was obtained from Contract Representatives of the Environmental Protection Agency and from industry trade associations, particularly the National Canners Association and the Frozen Food Institute who contributed detailed information concerning these industries.

II. DEMAND CHARACTERISTICS

The demand for canned and frozen fruits and vegetables centers on a nation-wide market served mainly through retail food stores with secondary outlets being institutional food purveyers and further processors who manufacture prepared dinners and other convenience foods.

A. Products and Substitute Products

This study was restricted to a consideration of basic fruit and vegetable canning and freezing. Preserves, jams, jellies and frozen specialty products were not included. The specific products selected for study account for over 80 percent of the total volume processed.

The principal substitutes for canned and frozen fruits and vegetables are fresh fruits and vegetables. Overall, the degree of substitutability between fresh and processed fruit and vegetables is not close.

B. Size, Location and Relative Importance of Markets

Although there is some carryover of the pack of canned and frozen fruits and vegetables from one packing season to the next, total volume packed is the best indicator of aggregate demand for these products.

Total pack of canned vegetables in 1970-71 was approximately 325,596,000 cases (24/303 can equivalent). Volume packed has remained relatively stable during the past 10 years. Four products (tomato products, sweet corn, green beans and green peas) account for over 70 percent of the total pack.

Canned fruits and fruit juices pack, 1970-71, was approximately 208,113,000 actual cases. Volume has increased slightly during the past ten years, up from approximately 138,000,000 cases in 1961-62. Four fruits (peaches, apple sauce, pineapple and fruit cocktail) accounted for over 50 percent of the total pack.

The pack of frozen vegetables has risen steadily since 1961, from 2.1 billion pounds in that year to nearly 4.5 billion pounds in 1970-71. Potato products represented over half of the total tonnage frozen with peas, corn and green geans accounting for an additional 17 percent of the total pack.

Frozen fruits and fruit juices do not show the consistent upward trend which characterizes the pack of frozen vegetables. Pack of frozen fruits has been relatively stable near 700 million pounds.

Demand changes - specific products - Although there have been substantial shifts in the demand for specific canned and frozen fruits and vegetables in the last 10 years, analysis of these relationships show certain identifiable patterns.

* There is a trend, in both canned and frozen fruits and vegetables, for increased demand for convenience products, e.g., canned and frozen potato products, etc.

* There is a definite trend toward increased consumption of fruit juices, both canned and frozen.

* Tomato catsup and chile sauce are gaining rapidly in demand.

Per capita consumption - Some very distinct changes have occurred in patterns of consumption of fruits and vegetables by the American consumer in the past two decades.

* Fruits and juices - Per capita consumption of canned and frozen fruits and juices increased steadily from 43 pounds in 1950 to 67 pounds in 1970 and is expected to reach approximately 75 pounds by 1980.

* Vegetables - Percapita consumption of canned and frozen vegetables has increased gradually over the past 20 years, from about 83 pounds in 1950 to 115 in 1970 and further increases to approximately 128 pounds per capita are projected by 1980.

International trade - Exports of canned vegetables from the United States are not of significant volume, in relation to total pack, for any item. However, the export market accounts for 9 to 15% of canned fruit cocktail, cherries, peaches and pineapple. Export markets take 41.5 percent of the U. S. hot pack orange juice volume, 18.5 percent of the canned grapefruit juice pack. Frozen concentrated orange juice is the principal frozen product exported. Exports of frozen vegetables are of little importance.

Canada and Western Europe are the principal export markets.

Imports of processed fruits, vegetables and juices are primarily tropical or subtropical products not produced in the United States. However, imports of canned apple juice and pear juice, canned pineapples and juices, frozen strawberries and blueberries, tomato products and mushrooms are imported in substantial quantities and do compete with similar products processed in the United States.

Government purchases are an important element of total demand for canned products and account for 4 to 6 percent of the total pack of canned fruits and vegetables and 10 to 12 percent of the total canned juice pack. Governmental use accounts for 2-3 percent of the total pack of frozen fruits and vegetables and slightly over one percent of the frozen juice pack.

C. Recent Trends in Demand and Price

Demand trends - A more detailed examination of total industry demand shows that the demand for certain specific products is advancing while for others demand is declining. With the exception of tomato juice, apples, lima beans and strawberries, the demand trend for processed fruits and vegetables has been either constant or increasing over the past ten years.

Price trends - Prices of canned and frozen fruit and vegetable products vary from year to year in response to current year pack and year-end carryover stocks. In addition, they are subject to exogenous economic pressures related to production and processing costs and purchasing power of consumers. During the past five years prices have generally trended upward with the exception of corn, lima beans, tomato juice and cherries.

D. Distribution Systems

Eighty-four percent of the canned fruits and vegetables move into use through retail food stores. Retail chains handle 49 percent directly and wholesale or cooperative buying groups 35 percent. Sixteen percent move through institutions, government, and to further processing.

Frozen products follow a similar pattern except a lesser percentage moves directly to the consumer while 28 percent goes to further processing and 15 percent to government and institutions.

E. Market Competition

Although the fruit and vegetable canning and freezing industries are characterized by the existence of large, multi-plant, multi-product firms, the industry is, nevertheless, highly competitive. There are a large number of small canners and freezers and the industry is faced with the necessity of selling a high proportion of its total pack to large, national food chains. Plants and firms located in any region are potential competitors to those producing the same product lines in all other regions.

F. Governmental Influences

The principal governmental influences relating to the fruit and vegetable industries are concerned with product and container standards, plant and product inspection and labeling requirements. There is little direct governmental influence over the marketing of these products.

III. SUPPLY CHARACTERISTICS OF THE FRUIT AND VEGETABLE INDUSTRY

The fruit and vegetable canning and freezing industries are supply-oriented in that, because of the perishable nature of the raw products, location of processing plants is largely dictated by the location of raw product production.

The diversity of products processed and seasonality of production of basic fruit and vegetable crops results in a nation-wide network of canning and freezing plants. However, major areas of processing are found as certain areas offer the greatest potentials for fruit and vegetable production.

A. Types and Locations of Raw Materials

Vegetables for Processing - Production of vegetables for processing is widely dispersed throughout the United States and commercial production is found in every state. However, production is concentrated (51% of total) in the West, mainly in California and the Pacific Northwest, with the North Central Region (31%) being the other major producing area.

Fruit Production - Nearly every state is a commercial producer of some kind of fruit, but production is concentrated in relatively few states. Seven states (California, Florida, Washington, New York, Michigan, Oregon and Pennsylvania) accounted for 88 percent of the total U. S. fruit tonnage, 1967-1969.

B. Number and Location of Firms/Plants

Fruit and Vegetable Canning Plants - The number of canning plants in the United States decreased from 1630 in 1958 to 1223 in 1967, a decline of 25 percent. There has been some slight shift in relative regional importance with the West and South gaining slightly over the East and Midwest. The leading states are California, 170; New York, 106; Wisconsin, 91; Florida, 69; and Maryland, 65. Based on historical trend, 800 plants are projected for 1980.

Fruit and Vegetable Freezing Plants - In contrast to fruit and vegetable canneries, the number of freezing plants increased from 303 in 1958 to 650 in 1963 but decreased to 607 in 1967 -- down 6.5 percent and is projected to decrease to 505 by 1980. The greatest number is in the West (32.6%) and the remainder are evenly distributed throughout the United States. California has the most plants (85), followed by New York (47), Washington (46), Illinois (36), Michigan (34) and Oregon and Pennsylvania.

C. Characteristics of Fruit and Vegetable Canning and Freezing Plants

Size of firms - A detailed analysis was made of the volume packed of a selected sample of 598 canners and 231 fruit and vegetable freezing firms.

Canners - Over a third of the firms analyzed (35.7%) would be considered as small canners, with an annual pack of less than 250,000 cases. At the other end of the range, 28.6 percent packed over 1,000,000 cases and 19 percent packed over 5,000,000 cases each.

Freezers - Approximately 30 percent of all freezers analyzed would be classed as small, with annual volumes of less than 5 million pounds. However, 46.6 percent would be considered large (annual volume in excess of 20 million pounds) and 22.9 percent had annual packs of over 100 million pounds.

Concentration of Processing Operations - The canning industry is characterized by a large number of firms, but a few major canners pack a high percentage of the total volume. Consequently a large number of small canners share a small segment of the total market. For the major canned commodities the largest third process approximately 80% of the product; the middle third processes approximately 15% of the product; and the smallest third processes approximately 5% of the product.

Although similar data were not available for freezing, it is believed that similar concentration exists in that industry.

Single Plant vs. Multiplant Firms - Over 85 percent of the canners in the United States are single plant firms. Of the remainder (14.9%), the two largest firms operated 31 plants each, one firm had 24 plants, two had 17 plants and one had 16 plants.

Eighty-two percent of the freezers were single plant firms. The largest firm had 9 plants, the second largest 8, third 7 and the other two large firms had 6 plants each.

Single Product vs. Multiple Product Plants - Most canners were multiple product plants, 64.4 percent packing more than one product.

The same situation existed for freezers, where 57.5 percent were multiple product operations and 20 percent packed 4 or more products.

Diversified vs. Specialized Plants - Primary products (basic fruits, vegetables and juices) represented 90 percent of the total value of gross sales of fruit and vegetable freezing plants.

Stage in Production Process - All plants considered in this analysis were primary canners or freezers of fruits and vegetables. No secondary (reprocessing) activities were considered.

Degree of Integration - There is only a small degree of vertical integration (either forward or backward) in the fruit and vegetable processing industries. Only about 8 percent of canned fruits and vegetables and 9 percent of the frozen products were produced on land owned or rented by processors.

D. Employment

Fruit and vegetable canners and freezers are major employers of labor in the areas in which they operate. Further, they employ a high proportion of low-skilled workers in relation to total employment in the industry.

Employment by canners dropped from 108,400 in 1958 to 100,000 in 1967, a decline of 7.7 percent. At the same time, employment per plant increased from 66 to 82.

Employment by freezers in the 1958-67 period increased from 39,500 to 64,500, a gain of 63 percent. Average number of employers per plant increased from 93 in 1958 to 106 in 1967.

E. Capacity and Utilization of Capacity

It is recognized that appreciable excess capacity normally exists in both the canning and freezing industry. Utilization of capacity is generally higher in larger plants and in intensive, commercial production areas. Due to the fact that there is substantial year-to-year variation in the production of fruits and vegetables, 10-20 percent standby capacity is desirable. However, the only definitive study made showed utilization rates in Southern plants at 57 percent by canners and 74 percent for freezers.

F. Industry Segmentation

For the purposes of this study the canning and freezing industries were segmented by size. A "large" plant represents the average size in the largest third of the industry and approximately 80 percent of total volume; the "medium" size plant, the middle third and 15 percent of total volume; and the "small" plant, the smallest third and 5 percent of the volume.

IV. METHODOLOGY

The economic impact of pollution abatement costs on the fruit and vegetable canning and freezing industry can affect different sized plants in different ways. Economies of scale in processing costs as well as pollution abatement cost will lead to a differential impact on individual firms. A microeconomic evaluation of plants within the fruit and vegetable processing industry was conducted to assess probable impacts within the industry. From this base of information, overall impacts on the industry were projected.

A. Analytical Approach

For this study an economic-engineering approach was used to provide costs and revenue situations for representative processing plants. A 20-year planning horizon was used to simulate operations, both with and without internalized pollution abatement controls.

A series of operating situations for representative plants were simulated based on volume of operation, level of technology, level of capacity utilization, number of products and length of operating season. All these assumed operating conditions will affect the profitability of a processing plant and its ability to withstand pollution abatement costs.

The economic performance of individual plant operations was evaluated using the technique of discounted economic cash flows and internal rate of return analysis. This analytical technique is widely used in investment feasibility analyses and is appropriate for purposes of this study to assess economic impacts of proposed additional investments in pollution abatement facilities.

The internal rate of return, as a measure of investment feasibility, provides a "present value" comparison of current and future costs and income streams resulting from a plant operation. In essence, the internal rate of return is the discount rate which makes the "present value" of money invested in a given project over a period to time equal to the "present value" of money received over the length of the project.

This analytical technique by-passes the many problems of depreciation assumptions, etc. that would be necessary in an analysis of present unit cost of processing operations both with and without pollution abatement controls.

B. Water Pollution Abatement Costs

Water pollution abatement costs used in this study were provided by the CEQ. They were calculated with a computer based model developed to estimate both investment capital and operating capital required by the nation's industries

to attain water pollution control standards. These "standards" are defined as equivalent of secondary treatment.

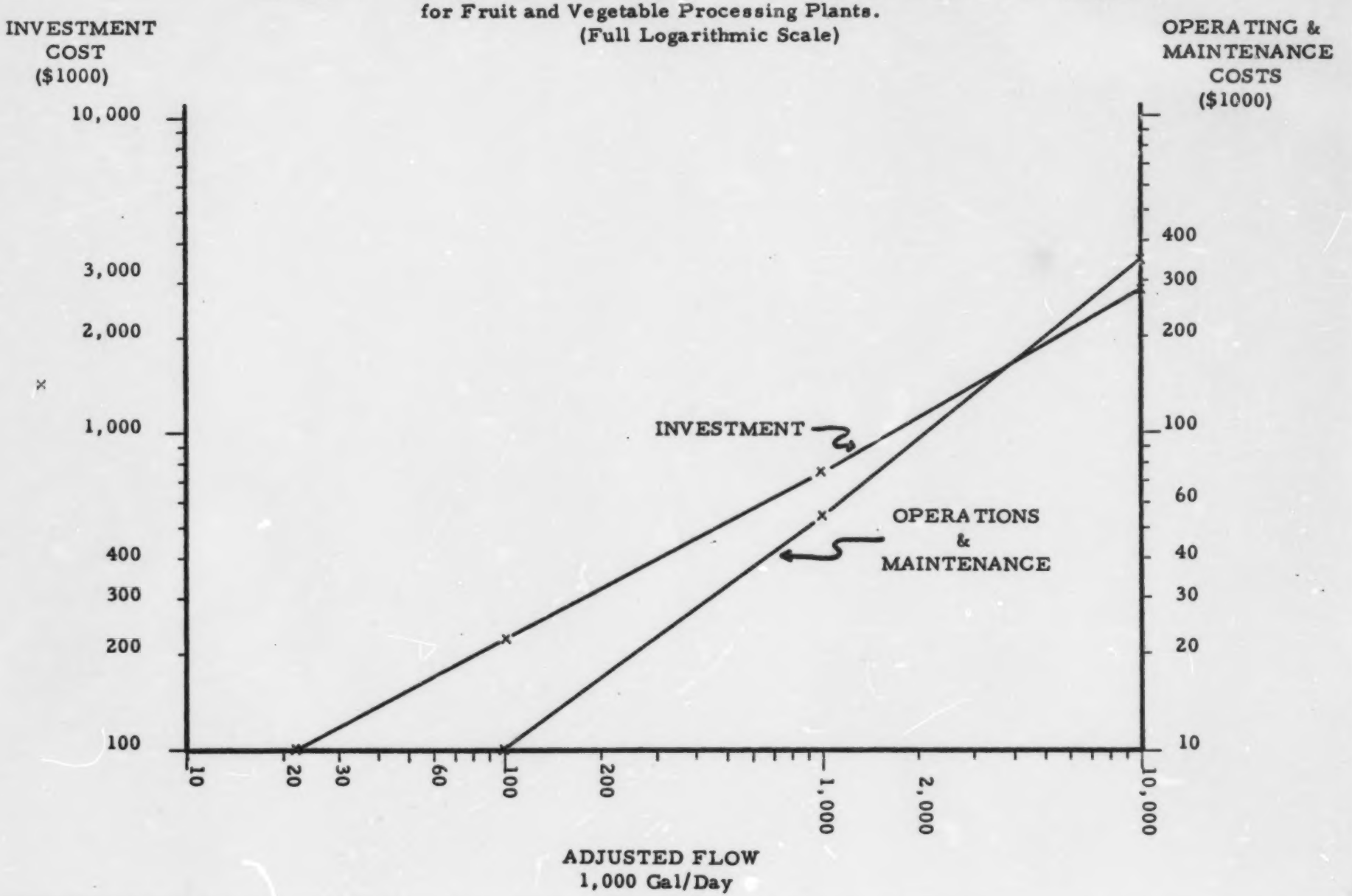
The configuration for a water plant to serve a fruit and vegetable processing plant is based on the following technology:

Method	Percent of Wasteflow Processed
Equalization	50
Flotation	100
Sedimentation	100
Biological stabilization	140

The actual flow of waste water was calculated by the kind of product processed and the number of cases processed per day. The actual flow of waste water was "adjusted" by a scaling factor of 2 to the .6 power to account for level of pollutants in waste water from the fruit and vegetable industry.

The adjusted flow was used to derive the appropriate capital investment and operation and maintenance cost from the relationship shown in Exhibit 1. The Council on Environmental Quality recognizes these costs are subject to variation under alternative conditions and established a reasonable range of -30 percent to + 30 percent.

Exhibit 1. Estimated Pollution Abatement Costs by Unit of Water Flow (adjusted) for Fruit and Vegetable Processing Plants. (Full Logarithmic Scale)



V. INDUSTRY ANALYSIS

Economic cash flows were developed for major product lines under alternative conditions. Wherever data would allow, cash flows were developed for representative plants with an annual volume equal to the industry average for the largest third, middle third and smallest third plant groupings. Average volumes for the representative plants amounted to 80 to 200 cases per hour for the small plants, 170 to 400 cases per hour for the middle sized plants and 600 to 1,500 cases per hour for the large plants.

A. Size of Firms

Volume of production by type of plant proved to be a major factor in the level of returns. Large plants consistently proved to have higher returns than medium, or small size plants. For example, the internal rate of return for the multiproduct pea and corn canning plant was calculated at 50 percent for the large, 18 percent for the medium and 7 percent for the small. Data used for different product lines came from different sources, thus the rates of return should not be used to compare one product line with the second. The relative impact of size on various product lines was, however, comparable.

B. Impact of Other Variables

Capacity - The fruit and vegetable processing industry is currently operating at a level less than capacity. In the South the utilization rate was estimated at 57 percent for the canning industry and 74 percent for the freezing industry. Nation-wide the capacity is recognized at less than 75 percent. The rate of return drops sharply as the level of operating capacity is reduced -- on the average from 25 to 50 percent when operating capacity was reduced from 100 percent to 75.

Length of operating season - Because raw product availability is limited to specific short seasons, a single line plant may operate for as little as two months while other multiproduct firms may operate for as long as nine months. The effect of a longer season may be gained by operating at two or even three shifts. The longer season a plant can operate, the analysis shows, the more efficient it becomes.

Level of technology is difficult to assess in the fruit and vegetable industry. Many of the plants are relatively old, but throughout their useful life new equipment is added or used to replace that which is old or technologically obsolete. Many plants have been located at the same site for 20 to 40 years. As a result, most plants in the industry are a combination of old and new equipment. Generally, the newer equipment installed represents a higher level of technology than the old.

Even though capital investment costs are considerably lower in the older plants, higher operating cost generally offsets the advantage and results in a lower rate of return than newer plants. For a large plant with no pollution abatement facilities, returns are reduced from 42 percent to 33 percent for prevalent technology and 29 percent for old technology. A similar pattern exists for medium size plants, but older small plants perform at about the same level as the new plants. In other words, the older small plants are able to compete reasonably well with the newer ones.

C. Sensitivity Analysis of Pollution Abatement Cost

The impacts of pollution abatement costs at the micro level were evaluated, in part, by increasing revenues for the firm with abatement costs, to the level where the firm was operating with the same internal rate of return as experienced before pollution control. In effect this demonstrates the percent increase in revenues (or prices) required to cover the pollution abatement costs for a given firm.

The impact of pollution abatement costs were analyzed for each product grouping and a sensitivity analysis conducted for each. The analysis conducted on the corn and pea canning plants is shown on Exhibit 2 for illustrative purposes. Various increases in revenue were developed, then the rates of return were interpolated to identify the new price level which would provide sufficient revenue to offset the abatement cost. For the large corn and peas plant a 6.3 percent increase in product revenue is required, 8.6 for the medium plant and 11.0 percent for the small.

For the sensitivity analysis the pollution abatement costs were altered by 130 for the upper bound and 70 for the lower bound. This was for both investment cost and operation and maintenance cost. The revenue increase for the large plant under these conditions ranges from 4.4 to 8.1 percent. For the medium size plant the range is 6.1 to 10.3 percent and for the small the range is 7.7 to 12.6.

For those plants that must provide their own facilities, the following may be considered representative:

Plant Grouping	Percent of Total Volume	Percent Required Price Increase		
		Low	Average	High
Large	80	3.9	5.5	7.5
Medium	15	4.6	6.4	8.1
Small	5	7.2	9.6	11.6
Weighted average increase required		4.8	5.8	7.8

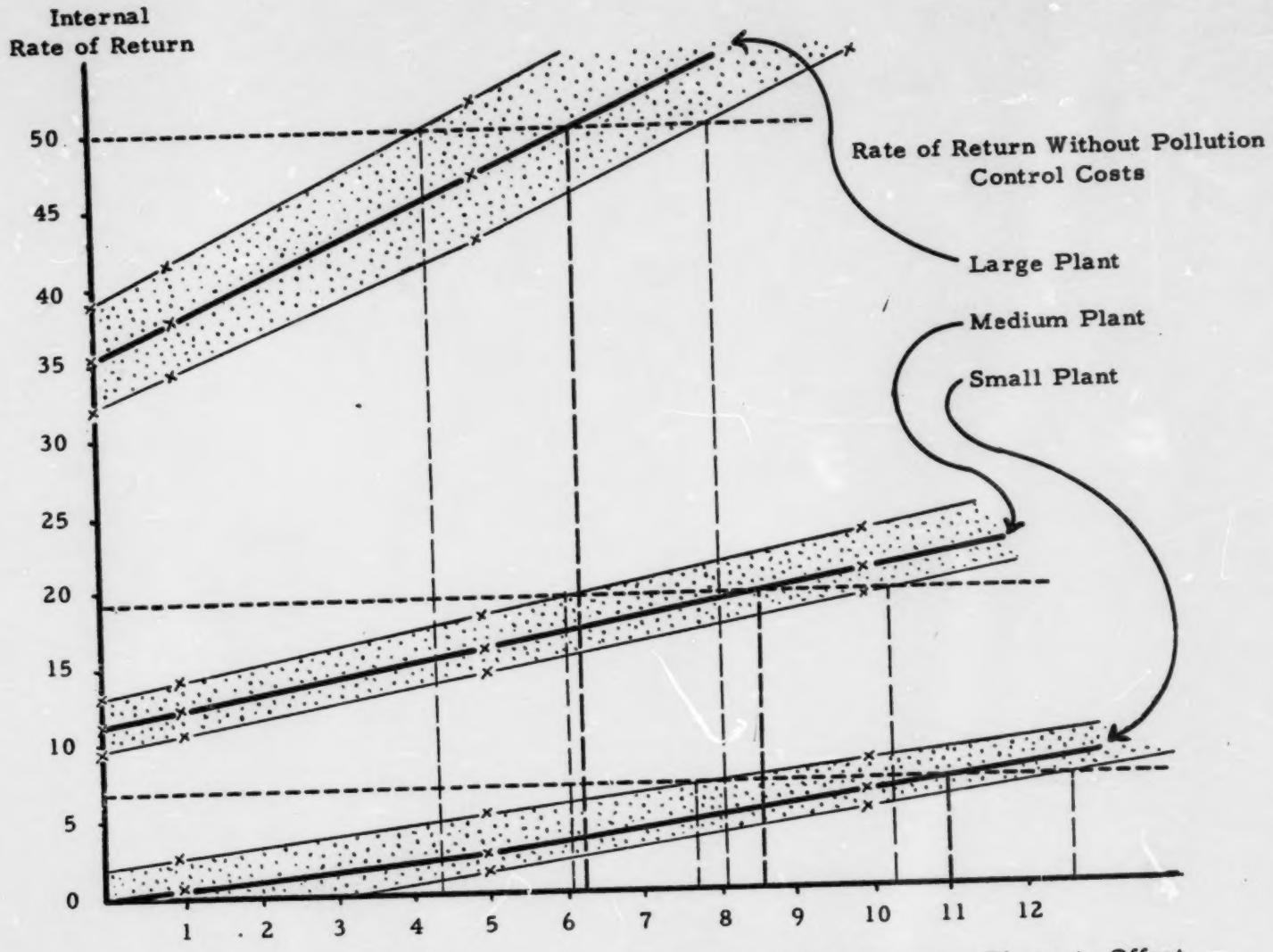


Exhibit 2. Price Increases Required by Various Sized Pea and Corn Canning Plants to Offset the Estimated Cost of Pollution Abatement Facilities (Plus or minus 30 percent)

Assuming that 50 percent of the individual plants will use municipal facilities and that they will not be subsidized by local communities, but must pay the incremental cost for use of a small city system, this will amount to the following:

Plant Grouping	Percent of Total Volume	Required Price Increase		
		Low	Average	High
Large	80	1.6	2.5	3.1
Medium	15	2.4	3.1	3.9
Small	5	2.5	3.2	4.2
Weighted average increase required		1.8	2.6	3.3
Average plant and municipal treatment		3.3	4.2	5.5

According to information received from CEQ, about 58 percent of the abatement technology is installed and is currently being paid for under present operating conditions and present price levels. Thus the overall price increase necessary to recover costs in pollution abatement facilities would amount to 1.8 percent with a range from 1.4 to 2.3 percent.

VI. OVERALL IMPACT ON THE INDUSTRY

Because of the unique structure and competitiveness of the fruit and vegetable processing industry, pollution abatement facilities will have very serious consequences on the industry itself. Unless some lower cost pollution abatement alternative such as municipal treatment can be found the smaller third -- and to some extent the middle third -- of the plants will be seriously impacted. They most likely will not be able to recover the cost of installing and operating the abatement facilities and will most likely be forced to shut down. Little impact, however, will be felt by the ultimate consumer of the fruit and vegetable products.

A. Price Increase

With an overall expected price increase of 1.4 to 2.3 percent, the less efficient medium sized plants and especially the small plants can not be expected to recover the costs expended for pollution abatement facilities unless they can develop lower cost alternatives. In addition, many of the small and medium size plants are currently operating in a marginal position and would not be able to cover the abatement costs from their current profit level. Larger plants appear to be in a stronger position. If the small and medium size firms would attempt to raise prices to the level where they could recover the costs of their pollution abatement facilities, they would be quickly undersold by the larger firm.

It should be remembered that the estimated level of capacity at which the industry is operating is approximately 75 percent or less. At that rate the large firms could quickly step up production to fill the void of the small and medium size plants that may be forced out of business.

Little impact of pollution abatement will be felt by the ultimate consumer. Because of the relative inelastic demand for fruits and vegetables, the resultant decrease in per capita consumption of fruits and vegetables is estimated at 0.5 to 1.0 percent or approximately 1 to 2 pounds per capita. This would be less than the total annual increase in consumption resulting from population expansion and projected increases in per capita consumption.

B. Impact on Profitability and Financial Position of the Industry

Profitability in the fruit and vegetable industry is generally considered low. With pollution abatement standards imposed on the industry profit margins will be further reduced because of the structure and competitive nature of the industry. While average incremental costs for pollution abatement are expected to be passed through to consumers, the smaller firms are expected to have much higher than average per unit costs of abatement.

Capital requirements for the fruit and vegetable industry are obtained primarily from standard commercial sources outside the industry. A firm must compete in the capital markets along with all other firms seeking capital. The primary requirement then is a demonstrated record of good performance and the individual firm's ability to project adequate net returns following an expanded investment program. Consequently, capital availability is directly related to profitability -- and the smaller, inefficient firms have difficulty raising the needed capital to stay in business.

It is anticipated that additional capital requirements for financing pollution abatement measures will also principally be sought from standard commercial sources. When smaller firms are not able to present evidence that they can increase prices to offset the abatement costs -- and when abatement financing requirements amount to 50 to 100 percent of their total capital investment -- small firms will simply not be able to compete in commercial financial markets for capital necessary to install pollution abatement facilities. The larger-more efficient plants, in a good position to recover a portion of their costs, will be in a much stronger position.

C. Industry Dislocations

The fruit and vegetable processing industry is comprised of many firms differing in process (canning, freezing), products processed (multi-single), size (rate per hour), length of season (long/short), capacity and utilization of capacity, level of technology (new/old) and other factors.

It is therefore extremely difficult to make broad generalizations for the industry. It would appear, however, from our analysis that the major variable is size of operation. From our analysis then, we can conclude that the small firm producing 5 percent of the total product and the medium size firm producing 15

percent of the product are faced with very serious difficulties should they be forced to add pollution abatement facilities to their operations. Other studies and our informal survey of key states indicates that roughly half of the plants will be able to utilize municipal facilities or possibly other low cost operations. This means that roughly one-third of the plants in the industry will be forced to shut down unless other low cost pollution abatement facilities can be developed. With approximately 1,200 plants in the canning and freezing industry this could mean the shut down of 400 plants.

Location - Many of the marginal processing plants likely to be affected adversely by pollution abatement controls are located in areas or regions of the country that are already relatively economically depressed. Processor, grower and associated businesses are generally a major component of local economic development in these areas; and, consequently, any appreciable impact on these businesses will also impact the entire local economy via indirect multiplier effects on area incomes, employment, sales, level of trade, etc. Such effects are likely to be far more consequential in aggregate than the direct impacts of pollution abatement on the industry itself. Specific locational effects are discussed in Part III.

D. Employment

Since many fruit and vegetable processing plants are located in relatively small urban centers and rural areas, the potential impact of dislocations may be born disproportionately by areas which already lag the nation in economic health. Approximately 90 percent of the employees of processing plants are relatively unskilled and only part-time employed. This large segment of the total labor force required is not generally mobil and would have difficulty relocating. The remaining 10 percent of management and higher-skilled production worker labor force would be more mobil, but many would not likely be needed or absorbed for some time by the remaining industry given current widespread underutilization of capacity in the industry.

The potential for individuals to shift from small plants that might be dislocated to larger plants is of limited significance. For example, the sweet potato canning plants analysed in this report had a production worker labor force of 55 people for the small (80 cases per hour), 90 for the medium (280 cases per hour), and 190 for the large (760 cases per hour). If 400 small and medium size plants were forced to shut down this would directly result in the loss of jobs by 28,000 employees.

E. Raw Product Suppliers

The impact of economic dislocations in the canning and freezing industries will be felt quite strongly by raw product producers. The industry, as pointed out earlier, is supply oriented. The locational pattern of processing plants is directly linked to the raw product production pattern. A majority of the

processing firms procure their raw product supplies from an area within 50 miles of the plant. Again, the opportunity to produce for larger processors is given little significance.

F. Supplies and Customer Impacts

Supplier Impacts - Suppliers of inputs will be affected mostly on an area-by-area basis due to expected plant dislocations rather than in aggregate. This follows in that industry-wide supply requirements, while perhaps depressed in the short-run, will soon return to and exceed previous levels. On the other hand, area-by-area dislocations will probably be long term.

Customer Impacts - Wholesale and retail customers can expect higher prices for products with consequent higher retail prices to final consumers. Given probable "pass-through" of prices, the net affect on the customer industries if expected to be relatively minor. An overall expected price increase of 1.4 to 2.3 percent and the generally inelastic nature of demands for fruits and vegetables, plus normal growth in demand, suggest that total volume of demand will not decrease drastically given the expected increase in price. A possible decrease of 1 to 2 pounds per capita can be expected.

G. International Trade

Imports of Processed Fruits and Vegetables - The impact of increased imports of processed fruits and vegetables associated with anticipated increased costs of domestic processed products, is generally expected to be limited.

Exports are significant for selected products and higher processing costs will affect the U. S. competitive position in foreign markets. If sales are reduced, a deterioration of U. S. balance of payments will result. The extent of this deterioration will depend on how effectively the particular segment of the industry can control pollution at a minimum cost.

Balance of Payments - The overall tendency of pollution abatement controls in the fruit and vegetable processing industry, because of relatively higher domestic prices, will be toward an adverse balance of payments: export sales volume will tend to be less, while import purchases will tend to be higher. However, loss in sales volume will be partially off-set in terms of balance of payments via higher prices. The net impact will not likely be substantial, however.

VII. SPECIFIC ECONOMIC DISLOCATIONS

A. Regional Impacts

A major effort was placed on determining expected differential region/area impacts of pollution abatement costs on the canning and freezing industries. The method used was to identify all known plants by location and other key attributes, particularly size. Cross-tabulation analyses were then completed with emphasis on size distribution patterns of all processing plants among regions, states, and counties within the continental United States.

A total of 1188 canners, freezers and combination canner/freezers were included in the analysis. A summary of results are illustrated in Exhibit 3, which is presented in four parts as follows:

Part A: Number, Type and Size Distributions of All Canning and Freezing Plants by Census Region, 1970.

Basic numbers of various type plants are presented by census region. For the U.S. as a whole, about 70 percent of all plants are canners, and approximately 15 percent are freezers and, also, combination canner/freezers.

A key distribution, however, is the size distribution of all plants among regions. Each type of plant was coded into three groupings: 'small,' 'medium,' and 'large,' so that approximately one-third would be in each for the U.S. as a whole. Hence, of primary interest is to identify those regions/areas which deviate from the overall average. Furthermore, on the premise that small plants will be most adversely impacted, concern is focused on region/areas containing above average levels of 'small' plants.

Part B: Percentages of Small Plants in Total and in EDA Qualified Counties Only

This bar graph of regional percentages of 'small' plants relative to total plants illustrates a wide variability in percentage levels among regions. Also, four of the nine census regions are shown to be above the U.S. average percentage: (1) New England, (2) South Atlantic, (3) Middle Atlantic, and (4) Mountain. These regions are expected to be more severely impacted relative to the remainder due to the higher concentrations of small plants. (See Part C for location of regions.)

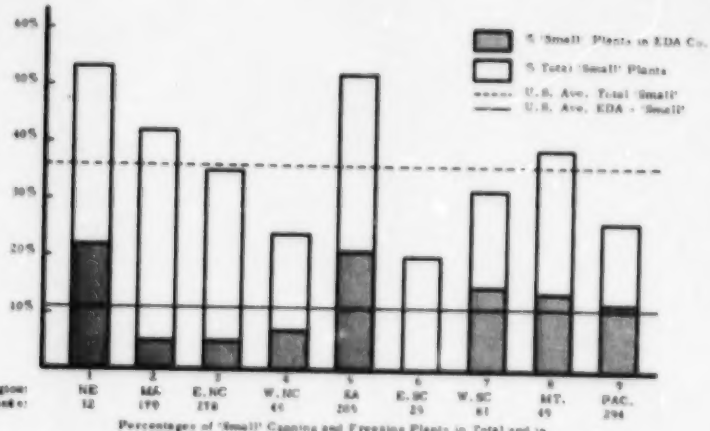
PART A

Number, Type and Size Distributions of All Canning and Freezing Plants, by Census Region, 1970

Census Region	Totals		All Plants					
			Number by Type Plant			Percent by Size		
	No.	Pct.	Canner	Freezer	Both	Small	Medium	Large
New England	32	3	19	9	4	53	34	9
Middle Atlantic	170	15	121	28	10	42	30	27
E. North Central	278	23	221	17	40	15	28	57
W. North Central	65	4	41	2	2	24	24	51
S. Atlantic	204	17	152	25	28	52	30	18
E. South Central	25	2	18	6	1	20	12	68
W. South Central	81	7	70	4	7	52	31	17
Mountain	49	4	33	8	8	39	27	33
Pacific	294	25	166	77	51	26	30	44
Total U.S.	1188	100	841	176	171	36	29	34

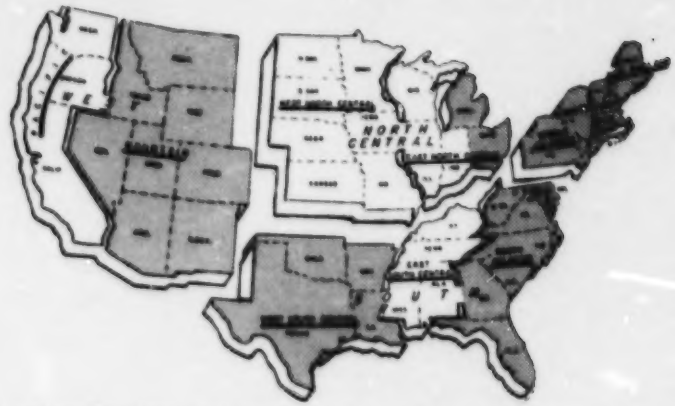
Source: Agri Business, Dunlap and Associates, Inc.

PART B


60%
50%
40%
30%
20%
10%
% 'Small' Plants in EDA Co.
% Total 'Small' Plants
U.S. Ave. Total 'Small'
U.S. Ave. EDA - 'Small'
Region: 1 NE 2 MA 3 E.NC 4 W.NC 5 SA 6 E.SC 7 W.SC 8 MT. 9 PAC.
Total Plants: 32 170 278 65 204 25 81 49 294

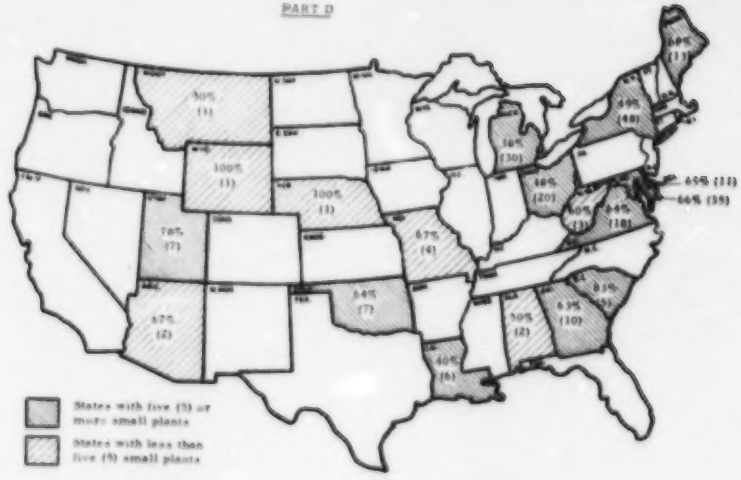
Percentages of 'Small' Canning and Freezing Plants in Total and in EDA Qualified Counties Only, by U.S. Census Region, 1970

PART C



Major Regions with Above U.S. Average Percentage of 'Small' Canning and Freezing Plants. (Plus Other States with More than 5 'Small' Plants and Above Average Percentage of Small Plants), 1970

PART D



States with Above U.S. Average Percentage of 'Small' Canning and Freezing Plants, 1970

EXHIBIT 3

A secondary measurement depicted in this graph in the percentage of 'small' plants which are also located in Economic Development Administration (EDA) qualified counties. Overall community impacts are expected to be especially critical should plants in these areas be shut down.

Part C. Major Regions with Above U.S. Average Percentage of 'Small" Plants

The four census regions with higher than average concentrations of small plants, as described in Part B, are shaded on the U.S. map shown. In general, the East, South and Rocky Mountain areas of the country are expected to be most seriously affected with the adoption of pollution controls.

Part D. States with Above U.S. Average Percentage of 'Small' Canning and Freezing Plants

Cross-tabulation analyses were also completed on location bases smaller than census regions, e.g., states, economic regions and subregions and counties. This part of the exhibit shows states having percentages of small plants above average.

On this less-aggregate basis, a more precise identification of probable 'problem areas' is obtained.

B. Local Impacts

The above overview of small plant distributions by region and state represents relative differences among these areas. However, all regions do have 'small' plants -- ranging from 20 to 53% as shown in Part A above. Thus, no region will be completely unaffected. (Also marginal 'medium' plants are expected to be impacted adversely. Note that 'medium' plants are rather uniformly distributed by region, however.)

A separate analysis on a county-by-county basis was also made to ascertain probable absolute impacts on local areas. A summary of all counties within the U.S. which have two or more small plants (regardless of the relative criteria above) is as shown in Exhibit 4.

While many counties with only single 'small' plants are not shown (about 60 percent of all small plants are in the counties depicted), those shown are representative of local areas which will be impacted. Special note

Exhibit I-4. Counties with Two or More 'Small' Canning or Freezing Plants (Approximate Actual County Locations), 1970.

is made of those areas, particularly in the West and North Central states, which will be impacted even though the affected plants are relatively few in comparison to total plants in their respective areas. Note again the distinction of EDA vs. Non-EDA counties. More adverse associated economic dislocations are projected for 'small' plants in EDA counties which are likely to be shutdown.

Further local area analyses are presented in Part III of this report. Also, individual plant data by county are provided in the Part IV Statistical Supplement.